TRIBOLOGY
INTERNATIONAL

Index to Volume 26 (1993)

Number 1 pp 1–80
Number 2 pp 81–154
Number 3 pp 155–228
Number 4 pp 229–300
Number 5 pp 301–366
Number 6 pp 367–454

Article Index

Number 1

A thermo-mechanical stress criterion for failure of surface-coated materials in concentrated sliding contacts
H. S. Ahn 3

Thrust bearing using a magnetic fluid lubricant under magnetic fields
K. Nagaya, S. Takeda, A. Sato, S. Ikai, H. Sekiguchi and N. Saito 11

A fast, robust, straightforward algorithm for thermal elastohydrodynamic lubrication
P. Yang and S. Wen 17

A new diagnostic technique for asperity contact
J. D. Smith 25

Friction and wear thresholds of alumina-chromium steel pairs sliding at high speeds under dry and wet conditions
Y. Guilmard, J. Denape and J. A. Petit 29

Abrasive wear of steels against silica-filled epoxy resins under combined rolling and sliding motion
A. P. Mouritz and I. M. Hutchings 41

Effects of honed cylinder surface topography on the wear of piston–piston ring–cylinder assemblies under artificially increased dustiness conditions
P. Pawlus 49

Tribo- and photo-simulated exoelectron emission from graphite
M. Tagawa, M. Mori, N. Ohmae, M. Umeno and S. Takenobu 57

Number 2

Tribological characterization of alumina and silicon carbide under lubricated sliding
L. C. Erickson, A. Blomberg, S. Hogmark and J. Bratthäll 83

An elastohydrostatic study of hole-entry hybrid flexible journal bearings with capillary restrictors
S. C. Sharma, R. Sinhasan and S. C. Jain 93

Tribological behaviour of an electrodischarge machined surface with a powder metallurgy bronze electrode
M. S. Shunmugam, P. K. Philip and A. Gangadhar 109

Tribological and structural characterization of a physical vapour deposited TiC/Ti(C,N)/TiN multilayer
E. Vancoille, J. P. Celis and J. R. Roos 115

Wear of steels implanted with oxygen or aluminium ions in air, oxygen and nitrogen
K. Langguth and H. Ryssel 121

Effects of liquid aluminium on hot-work tool steel
M. Sundqvist and S. Hogmark 129

Anomalous cracking of bearing balls under a liquid-butane environment
K. Mizuhara, T. Taki and K. Yamanaka 135

Number 3

Failure modes of ceramic elements with ring-crack defects
M. Hadfield, T. A. Stolarski, R. T. Cundill and S. Horton 157

Dry and water-lubricated slip-rolling of Si_3N_4- and SiC-based ceramics
M. Woydt and J. Schwenzien 165

Evolution of and preconditions for generation of corrugations on a plane surface in rolling contact
B. N. Pramila Bai, K. Haresh, S. K. Biswas, S. Biswas and S. K. Bhave 175

The scratch hardness and friction of a soft rigid-plastic solid
B. J. Briscoe, S. K. Biswas, S. K. Sinha and S. S. Panesar 183

A revised design of circular hydrostatic bearings for optimal pumping power
Y. K. Younes 195

Wear control in a variable-pitch lead screw with cylindrical meshing elements
Y. L. Su and J. S. Lin 201

Number 4

Editorial comment 230

20th Leeds-Lyon Symposium on Tribology provisional programme 231

Evaluation of oil samples from centrifugal separators
A. Jain, S. Biswas, S. Shrivastava and C. R. Jagga 237

Effects of antiwear additives on friction and wear properties of Cr_2O_3 coating
J.-J. Wei, Q.-J. Xue and H.-Q. Wang 241

The effect of nitrogen and sulphur compounds on extreme pressure lubrication
T. Singh and C. V. Chandrasekharan 245

Spring-supported hydrodynamic thrust bearing with special reference to elastic distortion analysis
A. N. Sinha, K. Athre and S. Biswas 251

Theoretical analysis of two configurations of aerostatic flat pad bearings using pocketed orifice restrictors
K. J. Stout, S. El-Ashkar, V. Ghasi and M. Tawfik 265

Number 5

Special Issue: Tribology in Powder Technology
Guest Editorial

I. Hutchings 303
Use of nanoindentation to assess potential attrition of particulate solids
P. A. Arteaga, M. Ghadiri, N. S. Lawson and H. M. Pollock 305
The effect of solid lubricants on powder attrition and breakage
M. L. Wyszynski and J. Bridgwater 311
On wear as a mechanism of granule attrition
B. J. Ennis and G. Sunshine 319
The abrasive wear of silica sand agglomerates
M. A. Mullier, J. P. K. Seville, F. Herbert and M. J. Adams 329
The interaction of bulk solid characteristics and surface parameters in surface or boundary friction measurements
A. W. Roberts, L. A. Sollie and S. R. de Silva 335
Prediction of lining wear life of bins and chutes in bulk solids handling operations
A. W. Roberts and S. J. Wiche 345
The use of impact plates in conveyor transfers
O. J. Scott and P. R. Choules 353

Number 6

An electron microscopy study of worn ceramic surfaces
A. Blomberg, S. Hogmark and J. Lu 369
Chemical characterization of antiwear films generated on steel by zinc dialkyl dithiophosphate using X-ray absorption spectroscopy
Z. Yin, M. Kasrai, G. M. Bancroft, K. F. Laycock and K. H. Tan 383
Synthesis and performance evaluation of O, O-dialkylphosphorodithioic disulphides as potential antiwear, extreme-pressure and antioxidant additives
R. Sarin, A. K. Gupta, D. K. Tuli, A. S. Verma, M. M. Rai and A. K. Bhatnagar 389
Industrial gear oil – a study of the interaction of antiwear and extreme-pressure additives
X. Fang, W. Liu, Y. Qiao, Q. Xue and H. Dang 395
Electroviscous effect of nematic liquid crystals
S. Morishita, K. Nakano and Y. Kimura 399
Generalized non-Newtonian elastohydrodynamic lubrication
M. M. Khonsari and D. Y. Hua 405
Fundamental dynamic performance of fluid-pivot and squeeze-film damper bearings
A. V. Harangozo and T. A. Stolarski 413
Cavitation erosion of copper and aluminium in water at elevated temperature
J. G. Auret, O. F. R. A. Damm, G. J. Wright and F. P. A. Robinson 421
The influence of water air content on cavitation erosion in distilled water
J. G. Auret, O. F. R. A. Damm, G. J. Wright and F. P. A. Robinson 431
Performance of three-lobe pressure-dam bearings
N. P. Mehta and S. S. Rattan 435
Elliptic-paraboloid method for calculating surface elastic deformation in EHL
L. S. Biao, M. J. Ju and C. X. Yang 443

Author Index

Adams, M.J. 329
Ahn, H.S. 3
Arteaga, P.A. 305
Athre, K. 251
Auret, J.G. 421, 431

Bancroft, G.M. 383
Bhatnagar, A.K. 389
Bhave, S.K. 175
Biao, L.S. 443
Biswas, S.K. 175, 183
Biswas, S. 175, 237, 251
Blomberg, A. 83, 369
Bratthall, J. 83
Bridgwaer, J. 311
Briscoe, B.J. 183

Celis, J.P. 115
Chandrasekharan, C.V. 245
Choules, P.R. 353
Cundill, R.T. 157

Damm, O.F.R.A. 421, 431
Dang, H. 395
Denape, J. 29

El-Ashkar, S. 265
Ennis, B.J. 319
Erickson, L.C. 83

Fang, X. 395

Gangadhar, A. 109
Ghadiri, M. 305
Ghasi, V. 265
Guilmard, V. 29
Gupta, A.K. 389

Hadfield, M. 157
Harangozo, A.V. 413
Haresh, K. 175
Herbert, F. 329
Hogmark, S. 83, 129, 369
Horton, S. 157
Hua, D.Y. 405
Hutchings, I.M. 41

Ikai, S. 11

Jagga, C.R. 237
Jain, A. 237
Jain, S.C. 93
Ju, M.J. 443

Kasrai, M. 383
Khonsari, M.M. 405
Kimura, Y. 275, 399

Langguth, K. 121
Lawson, N.S. 305
Laycock, K.F. 383
Lin, J.S. 201
Liu, W. 395
Lu, J. 369

Mehta, N.P. 435
Mizuhara, K. 135
Mori, M. 57
Morishita, S. 399
Mouritz, A.P. 41
Mullier, M.A. 329

Nagaya, K. 11
Nakano, K. 399

Ohmae, N. 57
Okabe, H. 275

Panesar, S.S. 183
Pawlus, P. 49
Petit, J.A. 29
Philip, P.K. 109
Pollock, H.M. 305
Pramila Bai, B.N. 175

Qiao, Y. 395

Rai, M.M. 389
Rattan, S.S. 435
Roberts, A.W. 335, 345
Robinson, F.P.A. 421, 431
Roos, J.R. 115
Ryssel, H. 121

de Silva, S.R. 335
Saito, N. 11
Sarin, R. 389
Sato, A. 11
Schwenzien, J. 165
Scott, O.J. 353
Sekiguchi, H. 11
Seville, J.P.K. 329
Sharma, S.C. 93
Shrivastava, S. 237
Shunmugam, M.S. 109
Singh, T. 245
Sinha, A.N. 251
Sinha, S.K. 183
Sinhasan, R. 93
Smith, J.D. 25
Sollie, L.A. 335
Stolarski, T.A. 157, 413
Stout, K.J. 265
Su, Y.L. 201
Sundqvist, M. 129
Sunshine, G. 319

Tagawa, M. 57
Takeda, S. 11
Takenobu, S. 57
Taki, T. 135
Tan, K.H. 383
Tawfik, M. 265
Tuli, D.K. 389
Umeno, M. 57

Vancoille, E. 115
Verma, A.S. 389

Wang, H. 241
Wei, J. 241
Wen, S. 17
Wiche, S.J. 345
Woydt, M. 165
Wright, G.J. 421, 431
Wyszynski, M.L. 311

Xue, Q. 241, 395

Yamanaka, K. 135
Yang, C.X. 443
Yang, P. 17
Yin, Z. 383
Younes, Y.K. 195

Keyword Index

Abrasion
Wear, Cylinder bores, 49
Abrasive wear
Low-alloy steels, Combined rolling and sliding motion, 41
Aerostatic bearings
Flat pad, Bearing geometry, 265
Agglomerates
Wear, Attrition, 329
Air (gas) content
Cavitation erosion, Distilled water, 431
Alumina
High speed sliding, Chromium steels, 29
Anti-wear additives
Cr_2O_3 coating, Friction and wear, 241
Antiwear
Dialkylphosphorodithioic disulphides, Extreme pressure, 389
Antiwear films
Phosphorus, Sulphur, 383
Asperities
Contact, Gears, 25
Attrition
Breakage, Solid lubricants, 311
Granule, Wear, 319
Wear, Agglomerates, 329

Bearing flexibility
Hole-entry journal bearings, Capillary restrictor, 93
Bearing geometry
Aerostatic bearings, Flat pad, 265
Boundary surfaces
Bulk solids, Interactions, 335
Breakage
Attrition, Solid lubricants, 311
Bulk solids
Boundary surfaces, Interactions, 335
Wear, Chutes, 345

Capillary restrictor
Hole-entry journal bearings, Bearing flexibility, 93
Cavitation erosion
Elevated temperature, Material effects, 421
Air (gas) content, Distilled water, 431
Central step
Circular thrust bearing, Load-carrying capacity, 195
Ceramic elements
Ring cracks, Spalling, 157
Ceramics
Sliding wear, Lubrication, 83
Wear, Dry friction, 165
Sliding wear, Wear debris, 369
Chromium steels
High speed sliding, Almina, 29
Chutes
Wear, Bulk solids, 345
Circular thrust bearing
Load-carrying capacity, Central step, 195
Centrifugal separators
Particulate contamination, Particle size distribution, 237
Coated solids
Thermo-mechanical stress, Failure criterion, 3
Combined rolling and sliding motion
Abrasive wear, Low-alloy steels, 41
Contact
Asperities, Gears, 25
Contact mechanics
Elastic deformation, Numerical calculation, 443
Conveyor transfers
Impact, Wear, 353
Corrugations
Rolling contact, Surface perturbations, 175
Cr_2O_3 coating
Anti-wear additives, Friction and wear, 241
Cracking
Hydrogen embrittlement, Hydrogen concentration, 135
Cylinder bores
Wear, Abrasion, 49

Dialkylphosphorodithioic disulphides
Antiwear, Extreme pressure, 389
Die casting
Liquid aluminium, Hot–work tool steel, 129
Distilled water
Cavitation erosion, Air (gas) content, 431
Dry friction
Ceramics, Wear, 165

Elastic deformation
Contact mechanics, Numerical calculation, 443
Elastohydrodynamic lubrication
non-Newtonian, Viscosity, 405
Electrodischarge machining
Metal transfer, Powder metallurgy bronze electrode, 109
Electroviscous effect
Liquid crystal, Nematic phase, 399
Elevated temperature
Cavitation erosion, Material effects, 421
Exoelectron
Graphite, PSEE, 57
Extreme pressure
Dialkylphosphorodithioic disulphides, Antiwear, 389
Oil additive, Oil immersion test, 395
Extreme pressure lubrication
Synergistic effect, Thiadiazoles, 245

Failure criterion
Thermo-mechanical stress, Coated solids, 3
Flat pad
Aerostatic bearings, Bearing geometry, 265
Fluid-pivot bearing
Squeeze-film damper bearing, Rotordynamics, 413
Friction and wear
Anti-wear additives, Cr_2O_3 coating, 241

Gears
Asperities, Contact, 25
Granule
Attrition, Wear, 319
Graphite
Exoelectron, PSEE, 57

Hardness
Process conditions, Mechanical handling, 305
High speed sliding
Alumina, Chromium steels, 29

Hole-entry journal bearings
Capillary restrictor, Bearing flexibility, 93
Hot-work tool steel
Liquid aluminium, Die casting, 129
Hydrodynamic lubrication
Three-lobe bearings, Three-lobe pressure-dam bearings, 435
Hydrogen concentration
Cracking, Hydrogen embrittlement, 135
Hydrogen embrittlement
Cracking, Hydrogen concentration, 135

Impact
Wear, Conveyor transfers, 353
Implantation
Wear resistance, Oxygen ions, 121
Interactions
Bulk solids, Boundary surfaces, 335
Interface shear
Normal hardness, Scratch hardness, 183
International research
Tribology Society, Tribology education, 275

Liquid aluminium
Hot-work tool steel, Die casting, 129
Liquid crystal
Electroviscous effect, Nematic phase, 399
Load-carrying capacity
Circular thrust bearing, Central step, 195
Low-alloy steels
Abrasive wear, Combined rolling and sliding motion, 41
Lubrication
Ceramics, Sliding wear, 83

Machine elements
Thrust bearings, Magnetic fluids, 11
Magnetic fluids
Machine elements, Thrust bearings, 11
Material effects
Cavitation erosion, Elevated temperature, 421
Mechanical handling
Process conditions, Hardness, 305
Metal transfer
Electrodischarge machining, Powder metallurgy bronze electrode, 109
Multilayer
PVD, Ti(C,N), 115

Nematic phase
Liquid crystal, Electroviscous effect, 399
non-Newtonian
Elastohydrodynamic lubrication, Viscosity, 405
Normal hardness
Scratch hardness, Interface shear, 183
Numerical calculation
Contact mechanics, Elastic deformation, 443
Numerical solutions
Thermal elastohydrodynamic lubrication, Thin film lubrication, 17

Oil additive
Extreme pressure, Oil immersion test, 395
Oil immersion test
Oil additive, Extreme pressure, 395
Oxygen ions
Wear resistance, Implantation, 121

PSEE
Exoelectron, Graphite, 57
PVD
Multilayer, Ti(C,N), 115
Particle size distribution
Particle contamination, Centrifugal separators, 237
Particulate contamination
Particle size distribution, Centrifugal separators, 237
Phosphorus
Antiwear films, Sulphur, 383
Powder metallurgy bronze electrode
Metal transfer, Electrodischarge machining, 109
Process conditions
Mechanical handling, Hardness, 305

Ring cracks
Ceramic elements, Spalling, 157
Rolling contact
Corrugations, Surface perturbations, 175
Rotordynamics
Fluid-pivot bearing, Squeeze-film damper bearing, 413

Scratch hardness
Normal hardness, Interface shear, 183
Sector-shaped pad
Spring-supported thrust bearing, Square-shaped pad, 251
Sliding wear
Ceramics, Lubrication, 83
Ceramics, Wear debris, 369
Solid lubricants
Breakage, Attrition, 311
Spalling
Ceramic elements, Ring cracks, 157
Spring-supported thrust bearing
Square-shaped pad, Sector-shaped pad, 251
Square-shaped pad
Spring-supported thrust bearing, Sector-shaped pad, 251
Squeeze-film damper bearing
Fluid-pivot bearing, Rotordynamics, 413
Sulphur
Antiwear films, Phosphorus, 383
Surface perturbations
Corrugations, Rolling contact, 175
Synergistic effect
Extreme pressure lubrication, Thiadiazoles, 245

Thermal elastohydrodynamic lubrication
Thin film lubrication, Numerical solutions, 17
Thermo-mechanical stress
Failure criterion, Coated solids, 3
Thiadiazoles
Synergistic effect, Extreme pressure lubrication, 245
Thin film lubrication
Thermal elastohydrodynamic lubrication, Numerical solutions, 17
Three-lobe bearings
Hydrodynamic lubrication, Three-lobe pressure-dam bearings, 435
Three-lobe pressure-dam bearings
Hydrodynamic lubrication, Three-lobe bearings, 435
Thrust bearings
Machine elements, Magnetic fluids, 11
Ti(C,N)
Multilayer, PVD, 115
Tribology Society
International research, Tribology education, 275
Tribology education
Tribology Society, International research, 275
Twin-roller test
Wear data bank, Variable-pitch cylindrical cam, 201

Variable-pitch cylindrical cam
Wear data bank, Twin-roller test, 201
Viscosity
Elastohydrodynamic lubrication, non-Newtonian, 405

Wear
Abrasion, Cylinder bores, 49
Ceramics, Dry friction, 165
Granule, Attrition, 319
Attrition, Agglomerates, 329
Bulk solids, Chutes, 345
Impact, Conveyor transfers, 353
Wear data bank
Twin-roller test, Variable-pitch cylindrical cam, 201
Wear debris
Ceramics, Sliding wear, 369
Wear resistance
Implantation, oxygen ions, 121

Laboratory reports 61, 285

International Report 275

News 62, 147, 211, 449

Book reviews 65, 149, 218, 293

Calendar 79, 153, 227, 299, 365, 450